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Wall slip in suspensions of thermo-responsive particles[1] THIBAUT DIVOUX, CRPP, CNRS UPR8641 - Université de Bordeaux, VÉRONIQUE LAPEYRE, VALÉRIE RAVAINE, ISM - UMR 5255 CNRS, Université de Bordeaux - ENSCBP, SÉBASTIEN MANNEVILLE, Laboratoire de Physique de l'ENS de Lyon, Université de Lyon — Flows of suspensions are affected by wall slip, i.e. the fluid velocity v_f in the vicinity of a boundary differs from the velocity v_w of the latter due to the presence of a lubrication layer. Wall slip is quantified by the slip velocity v_s, which is defined as $v_s = \mid v_f - v_w \mid$ and displays a power-law scaling with the stress σ at the wall. If the slip velocity of dilute suspensions robustly follows $v_s \propto \sigma^p$ with $p \simeq 1$, there is no consensus regarding denser suspensions that are sheared in bulk, for which v_s is reported to scale as a power-law of the stress with exponents inconsistently ranging between $p \simeq 0$ and 2. By means of extensive rheometry coupled to velocimetry on a suspension of thermo-responsive particles, we show that such discrepancy is only apparent, and demonstrate that v_s scales as a power law of the viscous stress $\sigma - \sigma_c$, where σ_c denotes the yield stress. Tunning the temperature reveals that such scaling holds true over a large range of packing fractions ϕ on both sides of the jamming point, and that the exponent p increases continuously with ϕ, from $p = 1$ (dilute suspensions) to $p = 2$ (dense assemblies). Our results pave the way for a unified description of wall slip.

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